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NGSS Update by Sean Elkins, KDE Science Consultant

The Kentucky Board of Education reviewed the Next Generation Science Standards (NGSS) at its April meeting, one day after they were publicly released. Kentucky was one of 26 states that partnered in developing the Next Generation Science Standards as part of a collaborative state-led process. About 40 Kentuckians, including P-12 science teachers (including three teachers specifically representing KSTA), state science and policy staff, higher education faculty, scientists, and engineers were involved. Two drafts of the standards were released for public comment, and they underwent significant revision based on the feedback.

The new standards, which have been in development for two years, meet the mandate for new standards in Senate Bill 1 (2009). The new science standards integrate core ideas, key practices and concepts that apply to many areas of science. The standards reflect the interconnected nature of science as it is practiced and experienced.

The standards are aligned with and explicitly make connections to the Kentucky Core Academic Standards for mathematics and English/language arts. If approved, they will be implemented in the 2014-15 school year.

Ken Draut, KDE associate commissioner for assessment and accountability, said Senate Bill 1 (2009) calls for students to be tested in science in 4th and 7th grades. Pearson, a testing vendor, will develop a blueprint for the tests over the summer and write items for about the next nine months. The new items would be field tested before ultimately being used in the spring of 2015, he said.

A recurring question has been about how the performance expectations will be assigned to grades in middle school in Kentucky. The second public draft was accompanied by an appendix containing model course progressions. The model course progression appendix listed two possible course sequences for middle school: a Science Domains model and a Conceptual Understanding model. State-lead team and public feedback on the two course models indicated a preference for the Conceptual Understanding model. This model reflects an integrated approach that includes life, earth and physical science concepts in every grade.

The model course appendix has been temporarily removed from the NGSS website so that it may be revised based on the changes in the final version of the standards. The authors of the NGSS are revising the course models to reflect these changes. Once it has been revised, the Conceptual Understanding model will be used to assign performance expectations to grades 6, 7 and 8 in the final version of the NGSS presented to the Kentucky Board of Education in June for approval. It will then move through the regulatory process.

The NGSS and several supporting documents may be downloaded from www.nextgenscience.org. A guide for how to read the NGSS is available from <http://www.nextgenscience.org>.

Science Connection: Literacy

The *SciJournal* Approach – Science Journalism in the Classroom

Submitted by Kelly Clark, KDE Literacy Consultant

With the pressure of NGSS, literacy standards, increased rigor, meeting the Writing Program Review expectations and evolving teacher standards, how do science educators find room for writing in their classroom? Based on my experience, science teachers are, on the whole, not comfortable with either teaching writing, creating prompts, researching, revising, grading writing or publishing. Truth be told, there are a fair number of teachers of many content areas, including English/language arts, who stall out on one or more pieces of the writing process. This feeling of floundering increases when pressure increases for better assessment results, increased amounts of content inserted into inflexible curriculum maps, diverse learners and the need to wrap it all up in an engaging and 21st century skill-driven manner for students.

Writing in the content area makes sense when the student product is in a real-world format in which they are familiar. The *SciJournal* approach, funded by the National Science Foundation, matches science journalism with science content to create both a rich learning experience by students and a polished piece of writing. “Science literate” students must be able to successfully formulate a question of current interest, investigate the question using multiple credible sources, digest and comprehend the information, and summarize and successfully communicate that information in writing. Using the *SciJournal* approach accomplishes those goals using real and timely science content.

The text, [*Front Page Science: Engaging teens in science literacy*](#), explains the engaging and authentic tasks that make up the process of being science literate. By using these deliberate and skill-building tasks, students become a part of the world of science discussion and discovery. The activities and lessons described in the text are supported by the online science journal www.Scijourner.org and the print version *SciJourney*, which are composed of student articles. The website www.Teach4scijournal.org is a support and resource for teachers trying to implement *SciJournal* in their classrooms.

Even the most reluctant science teachers see a tremendous gain in student motivation, engagement and depth of learning when they try the *SciJournal* approach. *SciJournal*, when implemented in the science classroom, meets almost every literacy standard and writing expectation, develops 21st century learners, embeds critical thinking, and instills collaborative learning and CCR standards into your classroom. *SciJournal* works with all science content, in any type of schedule with every level of student and can use different pacing. There are many ways to meet the challenges of your science content – *SciJournal* is a particularly effective method that accomplishes that while teaching kids about science.



Under Development: A Kentucky STEM Network

by Mindy Curless, KDE STEM Consultant

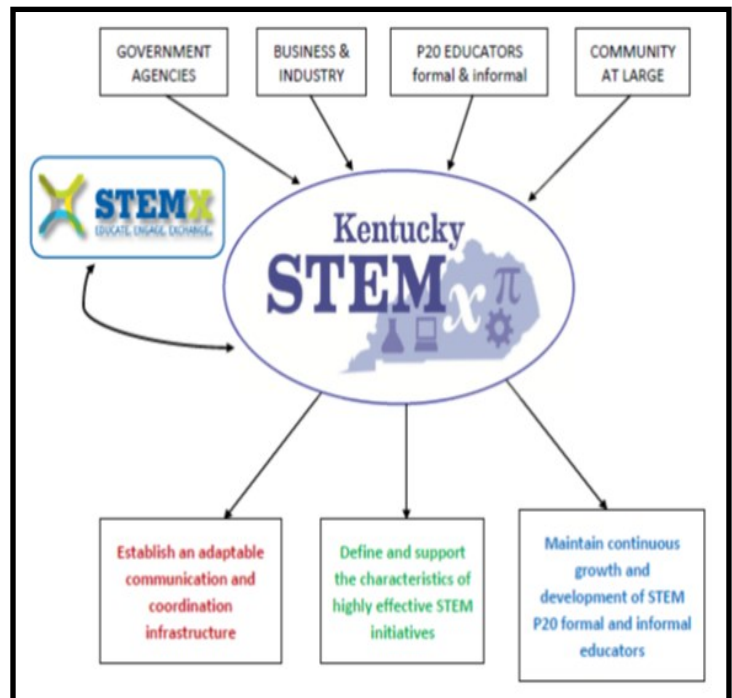
KDE is working with multiple partners to develop a statewide Science, Technology, Engineering and Mathematics (STEM) network to serve Kentucky students. This Kentucky STEM network will connect with a national STEM network organized by the Battelle Memorial Institute. Known as STEMx, the national network connects state networks and partners to accelerate the growth of policies, practices and partnerships that are needed to expand the number of STEM teachers, increase student achievement in STEM education and, ultimately, grow tomorrow's innovators.

Kentucky STEMx, facilitated through UK's P20 Innovation Lab, will connect stakeholders from across K-12 and higher education, business, government, philanthropy and the community to impact STEM education and workforce development in Kentucky. Kentucky, like most states, has multiple STEM-related centers, institutes and programs often operating in isolation. Kentucky STEMx is designed to recognize the good work of these individual centers and organizations, as well as connect them with each other to create a shared vision to ensure Kentucky students are prepared as critical thinkers, problem solvers, innovators and collaborators to compete and succeed in the STEM-driven global economy.

One of the goals of Kentucky STEMx is to have all stakeholders embrace a common understanding of STEM education. A starting point is to develop a definition for STEM Education. To date, this is our definition:

STEM education in Kentucky refers to the interdisciplinary teaching and learning of science, technology, engineering and mathematics from preschool through post-secondary, and develops a level of rigor sufficient to produce creative critical thinkers and innovative problem solvers who can thrive and adapt in a global economy.

Do you have suggestions or comments about this definition of STEM Education? Suggestions or ideas for Kentucky's STEMx Network? Please contact Mindy Curless, KDE's STEM consultant, at melinda.curless@education.ky.gov.



What is Happening in Your Neck of the Woods?



Who knows better what works in the classroom than those who are directly impacting student learning and achievement? Teacher contributions are welcome and will be included in *Science News*. We invite you to send in ideas, strategies, resources and lesson ideas to share with your peers across the state. Let us hear from you. E-mail your contributions to christine.duke@education.ky.gov. We look forward to learning more about best practices in science through your valuable experiences and insight.



Engineering by Design at Second Street Elementary School

by Christine Duke, KDE Science Consultant

The release of the Next Generation Science Standards (NGSS) brings a flurry of mixed reaction from the field. Some teachers are embracing the new standards, noting the value of integrating engineering practices and crosscutting concepts with the disciplinary core ideas. Others are on standby. Whatever your mindset, the new standards are here and Kentucky science educators will need to pull on their waders, don their “I think I can” caps and forge ahead starting with implementing the science and engineering practices of the NGSS.

For those of you ready to embrace NGSS and eager to find a starting place, let me share some information about a recently piloted elementary STEM program designed by the International Technology and Engineering Educators Association (ITEEA) titled Engineering by Design (EbD). The 3rd-grade teachers at Second Street Elementary School in Frankfort, in collaboration with a KDE consultant, implemented the lessons outlined in the EbD building block “*Every Drop Matters*.” Students were challenged to develop systems to conserve and reuse water as they explored the scarcity of water resources on Earth, as this relates to one of the Grand Challenges of Engineering identified by the National Academy of Engineering.

Second Street 3rd-graders engaged in a variety of integrated learning experiences outlined in the EbD building block. Students explored fractions as they relate to the percentage of water on earth; engaged in research activities focused on various water sources on earth as well as notable persons; practiced literacy strategies that supported the science content; and worked cooperatively to problem solve different scenarios using the design process. Formative assessments and STEM notebooks that provided a venue for students to share their thinking and understanding of the content were used throughout the pilot. The science notebooks also provided evidence of writing to learn, which is required by the Writing Program Review.



Students in Ms. Best's class created filtration systems to clean the water gathered from the Kentucky River.

The teachers developed other lessons to further engage the students in rigorous activities related to the content. A vocabulary activity named “**I Have/Who Has**” was created around the essential content vocabulary for this building block. Students called out the definition of a content vocabulary word and the student with the matching word called out “I have –.” This activity kept all the students engaged because they never knew when their word would match a definition. Reading frames and guiding materials also were made to meet the needs of students. Other hands-on engineering activities were created and integrated throughout the building block to further support the steps in the design process.

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Engineering by Design *cont.*

Ongoing formative assessments as well as the Every Drop Matters summative assessment showed strong evidence of student growth related to the objectives of the program. Students demonstrated greater understanding of green technologies, matter, earth materials and the importance of water conservation as well as the design practices used by engineers to solve real-world problems.

The Engineering by Design-Technology, Engineering, Environment, Mathematics and Science (EbD-TEEMS) programs provide a foundation for the standards-based instruction. ITEEA developed the national standards for technological and engineering literacy that serve as the primary organizer for the EbD programs. Each building block is aligned with the ELA and math common core state standards, uses concepts from the *Framework for K-12 Science Standards* and will be updated as part of an ongoing revision process. As a foundational instructional program, EbD-TEEMS allowed elementary teachers autonomy to meet the needs of their students by adding supports or refining the material. The teachers at Second Street Elementary report that they were pleasantly surprised to learn how easy it is to integrate science, math, literacy and engineering through the lessons provided in the building block. They also noted that their students found the content and activities to be interesting and were eager to learn more about clean water shortages around the world.



Mrs. VanAtter's and Ms. Bove's students demonstrate the results of their engineering skills.

The EbD-TEEMS programs are just one of many instructional programs that provide a jumping off place for teachers who want to begin integrating the elements of STEM into their instruction. Because Kentucky is part of a national consortium through the International Technology and Engineering Educators Association that develops STEM resources, the EbD-TEEMS resources are free and accessible to every teacher in the state if their school has joined the EbD Network.

If you have questions regarding any of the EbD programs, you can contact state EbD Director John Thompson (john.thompson2@education.ky.gov); KDE STEM Consultant Melinda Curless (melinda.curless@education.ky.gov) or Elementary Science Consultant Christine Duke (christine.duke@education.ky.gov). Further information is available at www.engineeringbydesign.org or www.iteea.org/EbD/ebd.htm.

Conference Information & Professional Development

The P-12 Math & Science Outreach unit of the Partnership Institute for Math and Science Education Reform (PIMSER) is hosting the following conferences:

The 3rd Annual **Meeting the Challenge: Standards, Differentiation and Assessment** conference is July 22-24 in Lexington, Ky. It features nationally- and internationally-recognized authors and presenters alongside local practitioners delivering full-day pre-conference sessions and 90-minute conference breakout sessions.

The focus this year is on **practical and applicable curricular, instructional and leadership strategies** that have been effectively applied in schools and classrooms. Teachers and administrators of all grade levels and content areas are encouraged to attend. Prices are:

Conference Combo \$475

Conference Only \$375

Pre-Conference Only \$175

Early bird prices end May 31. Discounts for groups of five or more. Visit the [conference website](#) for more details.

Two sessions of **Get Ready! Introduction to the Next Generation Science Standards** are being offered this summer. They are:

- Infusing the Practices into Units of Study
- Integrating Engineering into Units of Study

Participants will leave sessions with an understanding of the progressions for each practice, how to develop scientific explanations and engineering design solutions, an understanding of the two engineering core ideas, and methods of effectively integrating the practices and engineering into science units of study.

Cost is \$125 for one session or \$200 for both. Please go [here](#) for more information.

What's New in CIITS

CIITS: Educator Development Suite Added

The Educator Development Suite (EDS) is now available in CIITS as support for the implementation of the Professional Growth and Effectiveness System (PGES). EDS can be found by clicking the icons on the blue ribbon at the top of the [CIITS](#) homepage. This module supports the components of the PGES, and you will find the statewide observation framework, PD 360 videos, professional growth/ planning support, student voice results and additional reporting tools. New training support opportunities also have been added to CIITS [here](#) as well as login support that reflects EDS roles and permission requirements found on the KDE website [here](#). Please take a moment to check out this new and exciting EDS module in CIITS to help provide support for all Kentucky teachers and leaders.

Science News is produced by the Kentucky Department of Education's Division of Program Standards. For information about any of the items featured in this issue, please contact Christine Duke (christine.duke@education.ky.gov) or Sean Elkins (sean.elkins@education.ky.gov) at (502) 564-2106 .

